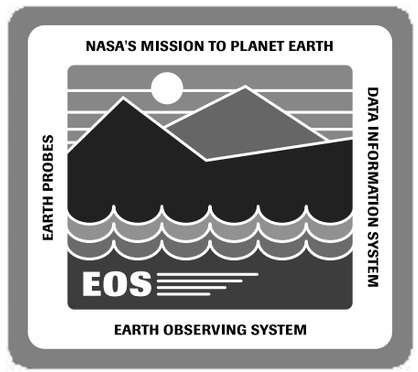
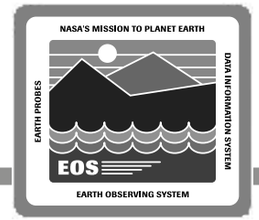


FOS Change Summary

Andy Miller

22 May 1996

FOS Change Summary



Topics

- **FOS Change Summary Overview**
- **FOS CCR Change Summary**
- **FOS Physical Architecture Change Summary**
- **FOS Interface Change Summary**
- **FOS Release Plan Change Summary**

FOS Change Summary Overview

Technical Interchange
- AM-1 Project
- AM-1 Instrument Workshop
- ECS Flight Ops Team
- External Interfaces

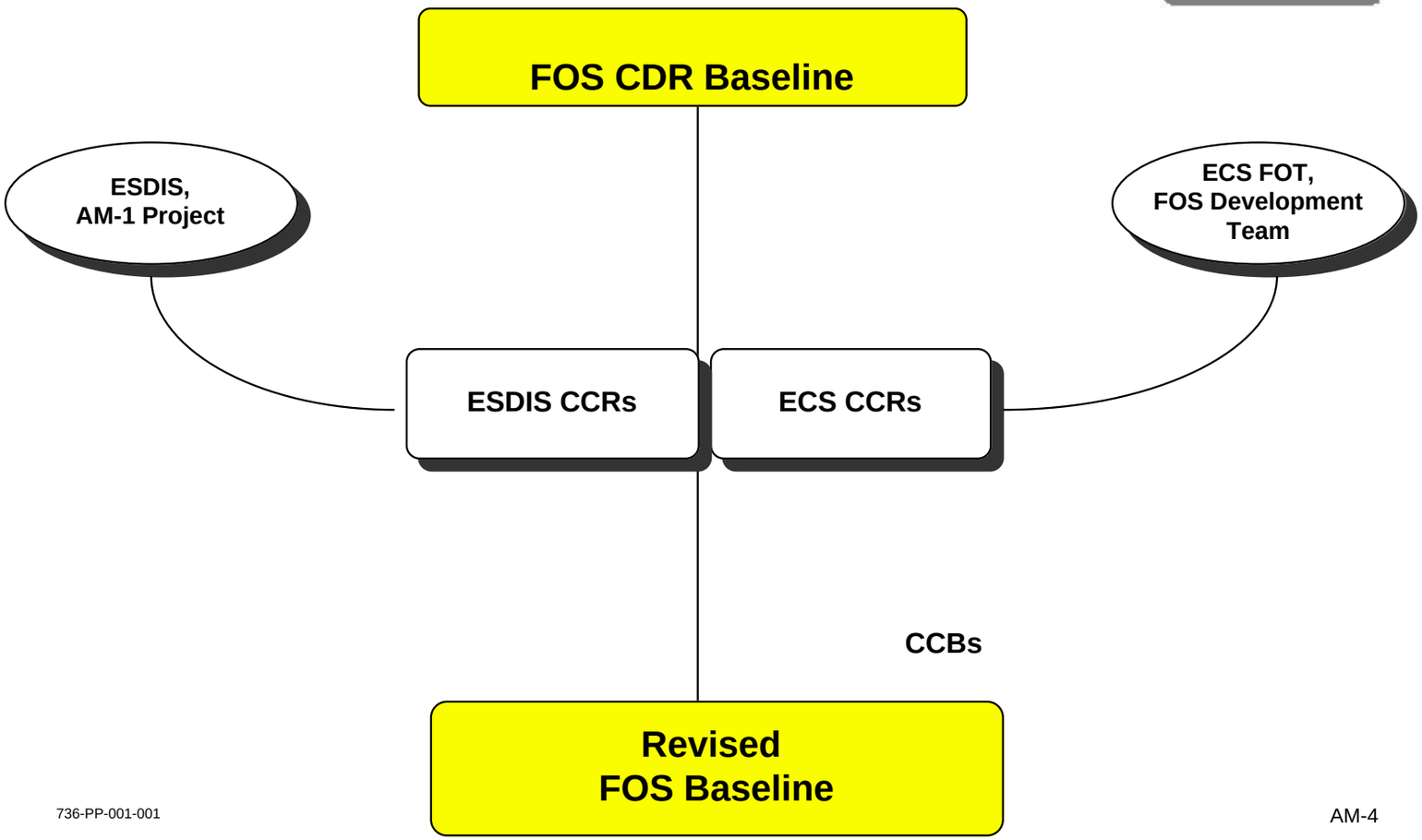
Approved CCRs
- ESDIS
- ECS

Development
- Code Walkthroughs
- Unit and I&T testing
- Refined design ideas

Updated FOS Requirements

Refined FOS Design

FOS Requirements Change Process



ESDIS CCR Summary

Title	Status	Planned Release	Subsystem(s)
IST at Valley Forge	Approved	Release A	All
Trash Buffer	Approved	Release B	Data Mgt, User Interface
DSN Monitor Blocks (deleted)	NASA preparing CCR	N/A	N/A
Hazardous Commanding	NASA preparing CCR	Release B	Command, Data Mgt
Adaptive Down-link	ECS submitted ROM to NASA	Release B, Post-Release B	All
Automation	ECS submitted proposal to NASA	Post-Release B	All

ESDIS CCR Summary

IST at Valley Forge

- **Add IST to Lockheed-Martin facility in Valley Forge (i.e., SDVF, spacecraft/EOC interface tests)**

Trash Buffer

- **FOS will provide the capability to receive, manage, and display the AM-1 trash buffer, and transfer it to external interfaces (e.g., SAS)**

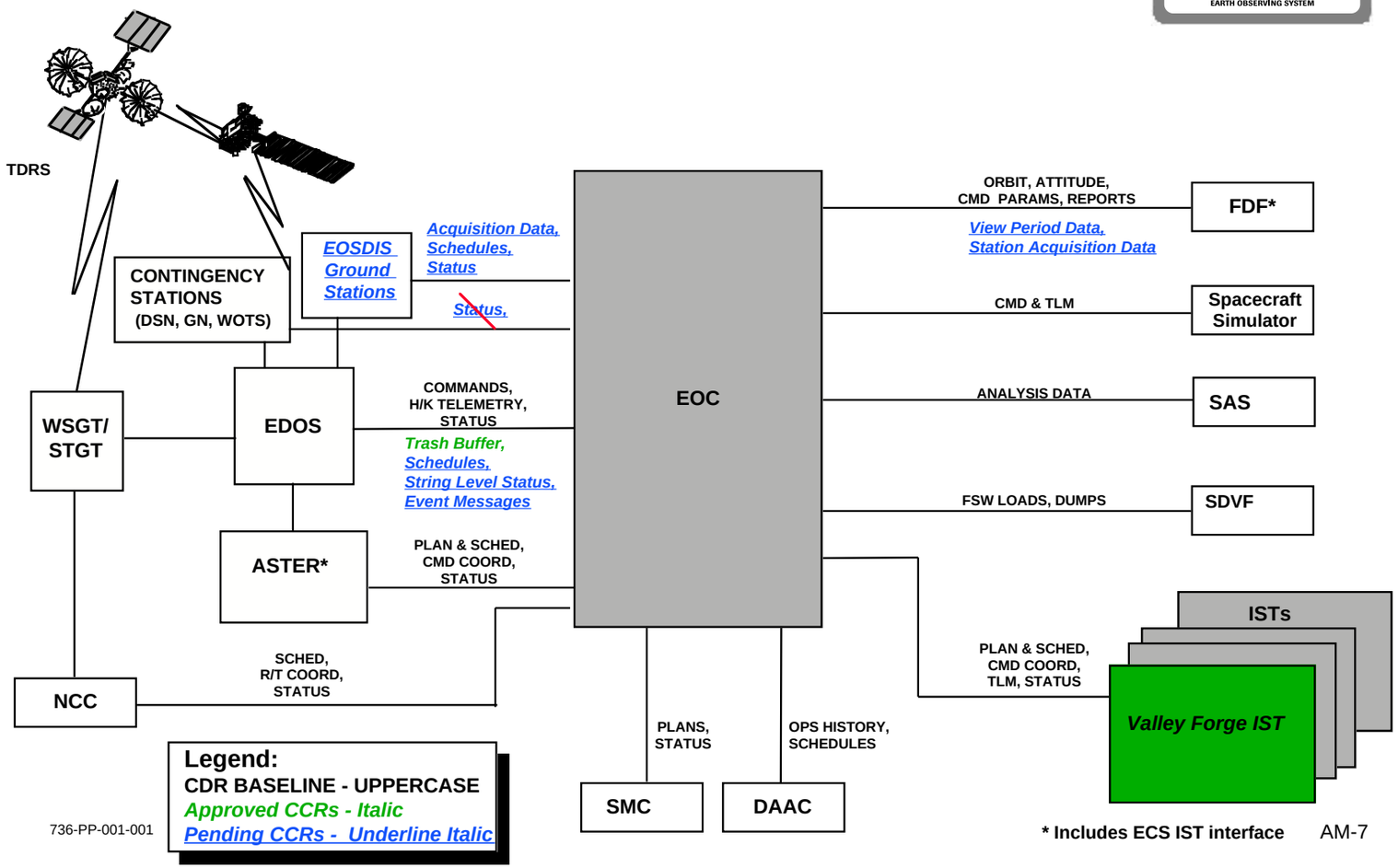
DSN Monitor Blocks

- **FOS will not receive and process DSN Monitor Blocks**
  - **Deemed not very useful to operations based on previous experience**
  - **Was only remaining FOS interface that used 4800 bit block interface after NCC changed interface to FOS to IP**

Hazardous Commanding

- **FOS will check for hazardous commands as defined in the PDB at the bit level prior to transmission to the spacecraft**

FOS Context Diagram



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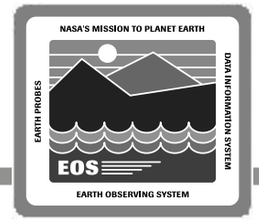
* Includes ECS IST interface

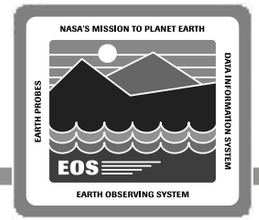
ESDIS CCR Summary



Adaptive Down-link (Release B functions)

- **Operations Concept**
  - **X-Band service on the AM-1 spacecraft will be used to down-link the high-rate science data to the X-Band backup stations in Alaska and Norway in the case of an anomaly in the HGA or the Ku-Band link**
- **Scheduling**
  - **FOS will receive additional products from FDF to support operations with the new X-Band backup stations (i.e., view period data)**
  - **FOS will provide opportunities for contacts**
    - **FOT will schedule contacts with WOTS**
    - **FOS will provide AOS/LOS**
- **Real-Time**
  - **FOS will support modifications to the FOS-EDOS interface to simplify forward link functionality at EDOS (i.e., PLOP-1/PLOP-2 moves from EDOS to FOS)**

ESDIS CCR Summary



Adaptive Down-link (Post-Release B functions)

- **Operations Concept**
  - **EOSDIS Ground Stations will be used for performing uplink and downlink operations (S-Band and X-Band) with EOS spacecraft in lieu of using the Space Network**
  - **SN will still be used for performing clock correlation functions and for performing tracking operations for all EOS spacecraft**
  - **SN or DSN/GN/WOTS could be used as a contingency network for command and housekeeping telemetry operations in the case of EOSDIS Ground Station failure**
  - **X-Band service on the spacecraft could be used to down-link the high-rate science data to the X-Band backup stations in Alaska and Norway**

ESDIS CCR Summary

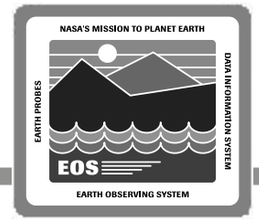
Adaptive Down-link (Post-Release B functions)

- **Scheduling**
  - **FOS will receive additional products from the FDF to support operations with the EOSDIS Ground Stations (i.e., view period data and station acquisition data)**
  - **FOS will distribute FDF acquisition data to the EOSDIS Ground Stations**
  - **FOS will develop, control, and distribute the ground station schedules for the EOSDIS Ground Stations**
- **Real-Time**
  - **FOS will receive RF terminal status data from the EOSDIS Ground Stations to enable the Flight Operations Team (FOT) to remotely monitor the status of the equipment at these two sites**
  - **FOS will receive EDOS ground system event messages and EDOS string level status messages to enable the FOT to remotely monitor the EDOS status**

ECS CCR Summary

Title	Status	Planned Release	Subsystem(s)
NRZ-M Encoding	Approved	A	Command
Command Submnemonics	Approved	A	Command, Data Mgt
EDOS Test Flags	Approved	B	Command
Command Test Blocks	Approved	B	Command, Resource Mgt
Replay ODMs and CODAs	Approved	B	Analysis, Real-Time Contact Mgt, Data Mgt, FUI, Resource Mgt
Pseudo Activities (deleted)	Approved	N/A	Planning and Scheduling
Event Alarm	Approved	B	User Interface

ECS CCR Summary



NRZ-M Encoding

- **Driven by AM-1 spacecraft design and FOS getting responsibility for implementing PLOP-1/PLOP-2**
- **Encode outgoing commands from the EOC in NRZ-M format**

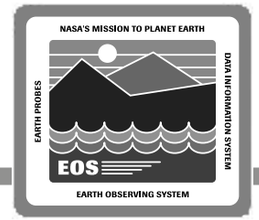
Command Submnemonics

- **Based on discussions with FOT, added more specificity to Level 4 Command subsystem requirements**
- **Accept command submnemonic values as states**
- **Allow for 3rd order polynomial conversion of submnemonic values**
- **Provide range checking submnemonic values entered by the user**

EDOS Test Flags

- **Set test flag in outgoing messages if in the Test Mode**

ECS CCR Summary



Command Test Blocks

- **Provide ability to send test messages to EDOS and receive echo response from EDOS as part of pre-contact checkout steps**

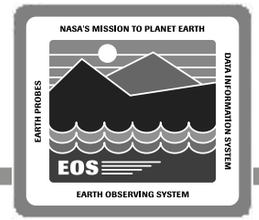
Replay of NCC User Performance Data and EDOS CODAs

- **FOT requested the ability to allow replay and analysis functions for NCC UPD and EDOS CODAs**
- **FOS building blocks in the baseline provided the core functionality (i.e., process NCC UPD and EDOS CODAs in real-time; archive the data; basic replay and analysis capabilities provided for housekeeping telemetry)**
- **FOS packaged building blocks to provide the FOT-requested capability**

Pseudo Activities (deleted)

- **Provided ASTER ability to reserve resources for long-term ASTER planning purposes**
- **ASTER can reserve resources through scheduling activities via the Short-Term Schedule it sends to FOS (48 days in advance)**

ECS CCR Summary



Event Alarm

- **Based on working with the FOT to refine requirements**
- **Added more specificity to Level 4 FUI subsystem requirements**
- **Require an operator to acknowledge each event that is defined as an alarm event**
- **Also allows the operator to locally disable the ackowledgement of alarms**

FOS Physical Architecture Change Summary

EBnet-provided Routers added to the EOC (EBnet Interface Router)

- **Solution coordinated with EBnet to ensure robust system security solution**
  - **EBnet Router**

    Provides IP-level filtering
  - **EBnet Interface Router**

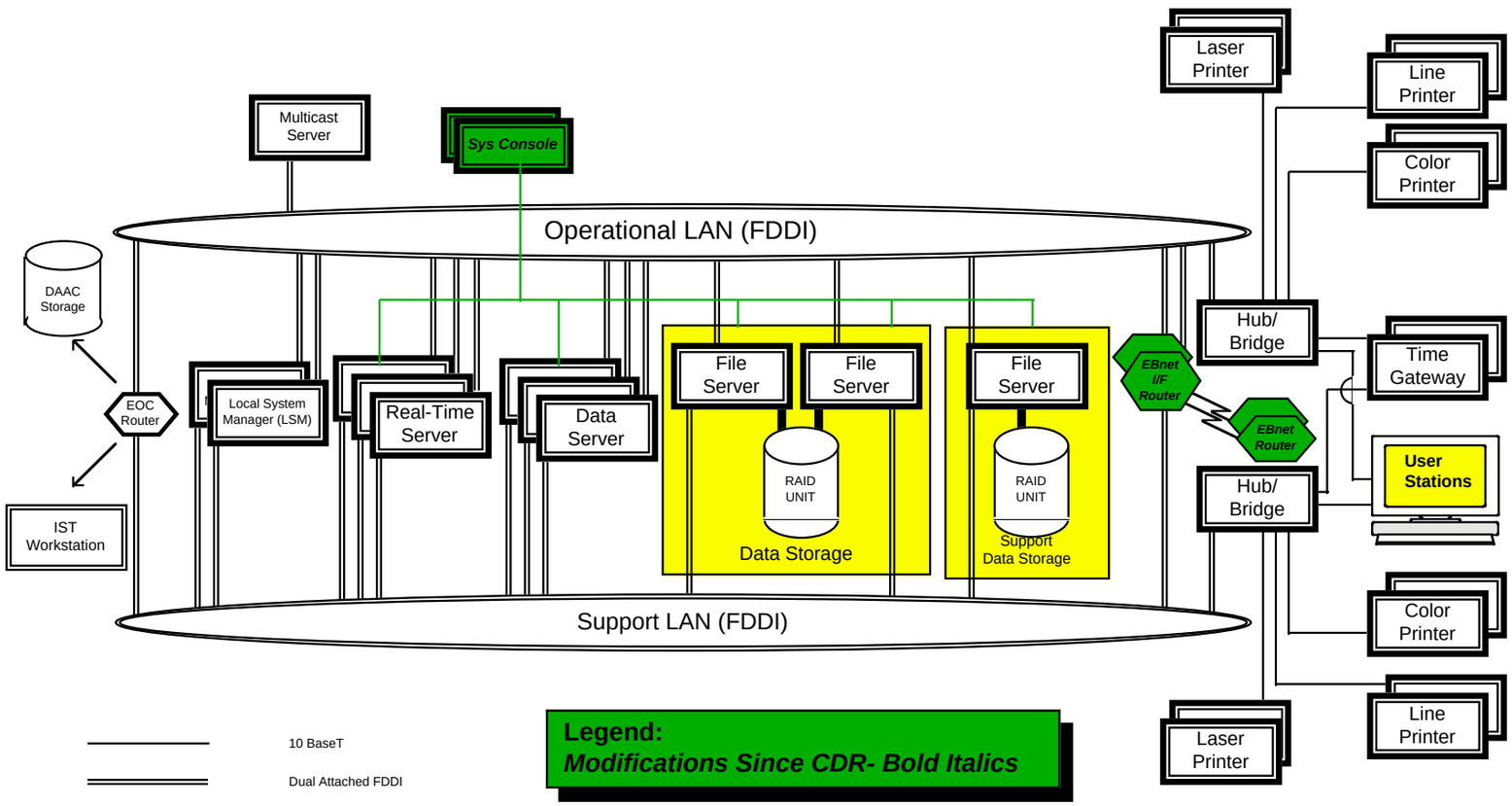
    Provides port-level filtering
- **EBnet Interface Router will interface with EBnet Router for following EOC interfaces**
  - **NCC, EDOS, ETS, FDF**
  - **ASTER ICC**
  - **SAS, SSIM, SDVF, IST at Valley Forge**

FOS Physical Architecture Change Summary

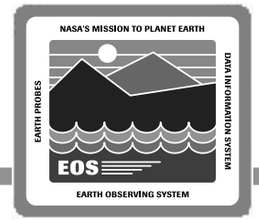
System Console

- **Added system console to the EOC**
  - **Connects to all FOS servers**
  - **Provides a single position for operator instead of having separate operator terminals for each server**
- **Streamlines System Adminstration functions**
  - **Facilitates system backups and maintenance tasks**
- **Saves space in the EOC**

FOS Block Diagram



FOS Interface Change Summary



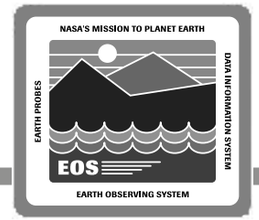
NCC IP interface

- **Change from 4800 bit block to IP format**
- **Take advantage of early availability of NCC '98 IP capabilities**

ASTER interface

- **CDR baseline defined in the ASTER ICD was for ASTER to use the ECS IST as a tool to fulfill interface requirements and to facilitate communicationss between ASTER IOT and ECS FOT**
- **ASTER presented a different understanding of the interface at the ASTER CDR in February 1996**
  - **ECS IST viewed strictly as an unmanned interface box**
- **FOS and ASTER discussed issues and reached a mutual agreement**
  - **ECS IST role modified by ASTER to be used to perform several of the key interfaces (e.g., procedure definition, RTCS definition)**
  - **ASTER is also planning to use ECS IST as a 'window into the EOC'**

FOS Interface Change Summary



MISR Interface

- **MISR changed the operations concept for loading its command parameter table**
  - **From microprocessor load to commands executed via the Absolute Time Command (ATC) buffer**
  - **MISR will utilize baseline Planning and Scheduling capabilities**

    Define and schedule activities that contain commands that will be sent to the MISR microprocessor from the Spacecraft Controls Computer (SCC)

EDOS Interface

- **Adaptive Downlink changes**

FOS Interface Issues

Interface	Issue	Action
ASTER GDS	Differing ECS IST Ops Concepts	Splinter meeting held at AM-1 Ops Workshop; revised ICD draft due end of May.
FDF	Schedule for Final ICD; Spacecraft Table Formats	Comments submitted on 5/96 draft; next update due in 11/96. Working with FDF & AM Project to identify FDF-supplied table parameters.
AM-1 ICD-106	Undefined Pseudo Ops & Inhibit IDs	Questions submitted to AM Project; Telecon planned for this week.

FOS ICD Status (ECS Lead)

ICD	Status	Comments
SAS	Baselined by ESDIS CCB.	Maintenance update planned in 6/96.
SDVF	Baselined by ESDIS CCB.	Maintenance update planned in 6/96.
DFCD	Current version dated 2/96.	Update planned in 6/96; ESDIS CCB planned for 7/96.
ASTER GDS	Current version dated 3/96. (one open FOS issue)	Update planned for end of 5/96; ESDIS CCB planned for 8/96.

FOS ICD Status (ECS Support)

ICD	Status	Comments
AM-1 ICD-106	Baselined by ESDIS & AM CCBs.	New version received from AM Project 4/96.
EBnet	Current version 3/96.	ESDIS CCB planned for 7/96.
EDOS	Comments submitted on 1/96 version.	Final scheduled in 6/96; ESDIS CCB planned for 8/96. Working on Adaptive Downlink
NCC	Baselined by ESDIS CCB. (Generic NCCDS/MOC ICD)	Update required for TCP/IP interface. Working new interface with Landsat and NCC
FDF	Comments submitted on 5/96 draft.	Next update scheduled for 11/96. ESDIS CCB schedule TBD.
SSIM	Comments submitted on 12/95 draft.	ESDIS CCB schedule TBD.

FOS Release Plan Change Summary

Key Points

- Changes do not impact any early interface testing
- Refine balance between Release A and B
- Opportunity to move some capabilities to Release A
- Dependent on an external interface

Release A to B

Planning and Scheduling
- Generate S/C Operations Plan
- Schedule BAPs

Real-Time Contact Management
- NCC Communications Test Message

User Interface (FUI)
- RTS Load Manager
- Info Window
- Quick Analysis

Release B to A

Planning and Scheduling
- Timeline (e.g., activities, orbital events, TDRSS communication opportunities)

Data Management
- Retrieve Events

Command Management
- Table Load Validation